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## NECTURUS MACULOSUS RAFINESQUE IN THE LOWER DELAWARE RIVER.

IN the *American Naturalist* for 1892, pp. 779 and 780, Mr. W. B. Marshall gives an account of 'Necturus maculatus in the Hudson River' in which he calls attention to the fact that no record is known to him of its inhabiting the Delaware River, though he presumes that it may probably be found there at some future time. I am very glad to justify his statements with the fact that I have received a mature living specimen for examination that was taken in Darby Creek, which is a tributary of the Delaware River and into which it empties several miles below Philadelphia. The precise locality was near Essington and the date of capture March 2d. When captured, being taken in a small cast net, it was said to have emitted a cry very much resembling that made occasionally by frogs when taken in the hand. The animal has now lived a week in captivity and has been feeding almost entirely on small fish and tadpoles. It seems particularly fond of the common Mud Minnow (*Umbra pygmæa*) and various small Sunfishes (*Centrarchidæ*), of which it has consumed about fifty or more. By the occurrence of this species in the lower Delaware, where, it would seem, it found its way from the Hudson River by means of the Delaware and Hudson canal, which connects the two rivers at Port Jervis and Kingston, it has enlarged its geographical distribution through the unintentional aid of man. Most likely the occurrence of other aquatic animals, indigenous to the western part of New York, that have or might be found in the Delaware basin, have reached the latter through the same means, as the Erie canal connects the Hudson with many of the streams of western New York.

HENRY W. FOWLER.

## LAMPREYS IN CAPTIVITY.

VERY small (6 mm.-8 mm.) Ammocetes larvæ are quite delicate, and it was only by the exercise of the greatest care that they were kept alive, in aquaria, for a period of six weeks.

Older larvæ (10 cm.-15 cm. in length), on the other hand, are remarkably hardy, and may be kept alive indefinitely in small aquaria of running water. It is not even necessary to

have a constant changing of water. Sand should be placed in the aquaria, in which the larvæ may bury themselves.

The adult lampreys are moderately hardy and may be kept in small tanks of running water without difficulty. By catching a number of the adults, in the spring, as they are passing up the rivers to the spawning grounds, and keeping them in captivity until sexual maturity is reached, it seems probable that artificial fertilization may easily be accomplished and embryological material thus obtained.

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## NOTES ON PHYSICS.

## THE RATIONALISM OF ELECTRICAL UNITS.

PRESENT electrical units are irrational in that the factor  $4\pi$  does not appear in certain equations where it would be proper for it to appear, while in other equations this factor does appear improperly. The British Association Committee on Electrical Standards fixed for us the present definitions of the units of magnetism and of electric charge when they published in one of their reports the little treatise on units by Maxwell and Jenkin. In this treatise the factor  $4\pi$  is suppressed for the sake of simplicity and the result is that we have an 'eruption of  $4\pi$ 's' in other quarters. This eruption is due, literally, as Heaviside puts it, to the wisdom of our ancestors, who, according to the same witty sage, were sufficiently wise in their generation.

Several proposals have recently been made looking to the rationalization of our electrical units. The complete solution of the difficulty, according to the wisdom of the present generation, is proposed by Heaviside. This proposal involves great changes in the magnitudes of all electric and magnetic units—a very serious matter.

Professor Fessenden proposes an ingenious solution of the difficulty which involves no important change in any of the units which are used by engineers. Professor Fessenden's solution does not, however, completely rid us of the irrational appearance of the  $4\pi$  factor, and if this solution were to be adopted by us, our posterity might still suffer by our wisdom.